Space Weather Forecast

Issued on Friday, 21 October 2022 at 13:23 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor geomagnetic storm likely from fast wind on UTC day of Sunday 23 October. Possible Earth-directed CME, analysis in course.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity over the past 24 hours has been low, with frequent small Common-class X-ray flares observed. Background X-ray flux showed a gradual rise compared with recent days, but reverted to earlier lower levels into the UTC day of Friday. The largest flare of the period was a middling common-class flare at 20/1653UTC from a now-departed sunspot on the northwestern solar horizon.

There are now up to four sunspot regions on the facing side of the Sun. The main occupants of the current front side were nearing the middle of the Sun's disc, with both showing some recent proliferation of their intermediate spots and spreading tendencies. Some development also occurred in the southwestern quarter, with this possibly a re-development of a minor decayed group, but also a new region to its east. Both of these latter potential regions are currently small and simple.

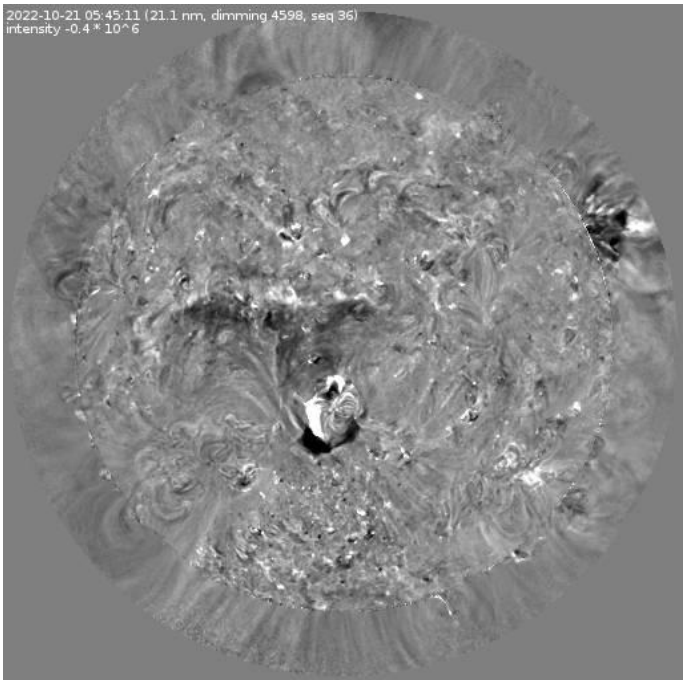

Figure 1: Time integrated extreme UV imagery of the aftermath of a 'filament eruption' – a potential CME-producing event, with analysis pending imagery. (Image processing courtesy of SIDC ROB)

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Starting at around 21/0415UTC, a possible 'filament eruption' (arc of plasma leaving the Sun, a possible Coronal Mass Ejection (CME)) occurred to the immediate east of one of the main sunspot groups. This potential CME-spawning event has yet to be analysed, with some early imagery perhaps suggesting at least a proportion of the release is angled above and ahead of the track of the Earth's orbit. This will be analysed as and when appropriate imagery becomes available. No other potentially Earth-directed Coronal Mass Ejections (CMEs) were in evidence.

Solar Wind / Geomagnetic Activity: The solar wind showed an exit from the long tail of a fast wind from a 'coronal hole' into a slow regime.

The solar wind speed declined from slightly elevated levels to normal background. The number of particles in the wind saw a slight rise in the same interval to become slightly elevated, however their associated magnetic field was stable and at background levels. The north-south component of the magnetic field showed an erratic tendency but also an overall drift from largely co-aligned (with Earth's field) to anti-aligned.

The net result of the above solar wind measures was for mainly quiet geomagnetic activity, well below Minor Storm G1.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is most likely to continue low, with a daily slight chance of an isolated Moderate-class X-rat flare. No notable regions leave or arrive on the Sun in the period.

Solar Wind / Geomagnetic Activity: No CMEs feature in the current forecast, however the 21/0415UTC event has yet to be analysed.

The geomagnetic forecast is now in a state of flux. There is only one coronal hole fast wind in the forecast. A marked increase in solar wind density leading this feature may now be in course at a satellite 1.5 days upwind of Earth, with the corollary that the onset of this coronal hole has been brought forward and its strength revised upwards.

Initial quiet geomagnetic conditions may increase to a Slight Chance of Minor Geomagnetic Storm G1 through day two (Saturday 22 October) in response to the aforementioned density increase, with an ensuing Likely Minor Geomagnetic storm G1 Sunday 23 October, becoming a Slight Chance on day four.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, being at Background levels and expected to remain so throughout given the lack of large sunspots.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	10	60	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	15	10	10	10
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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